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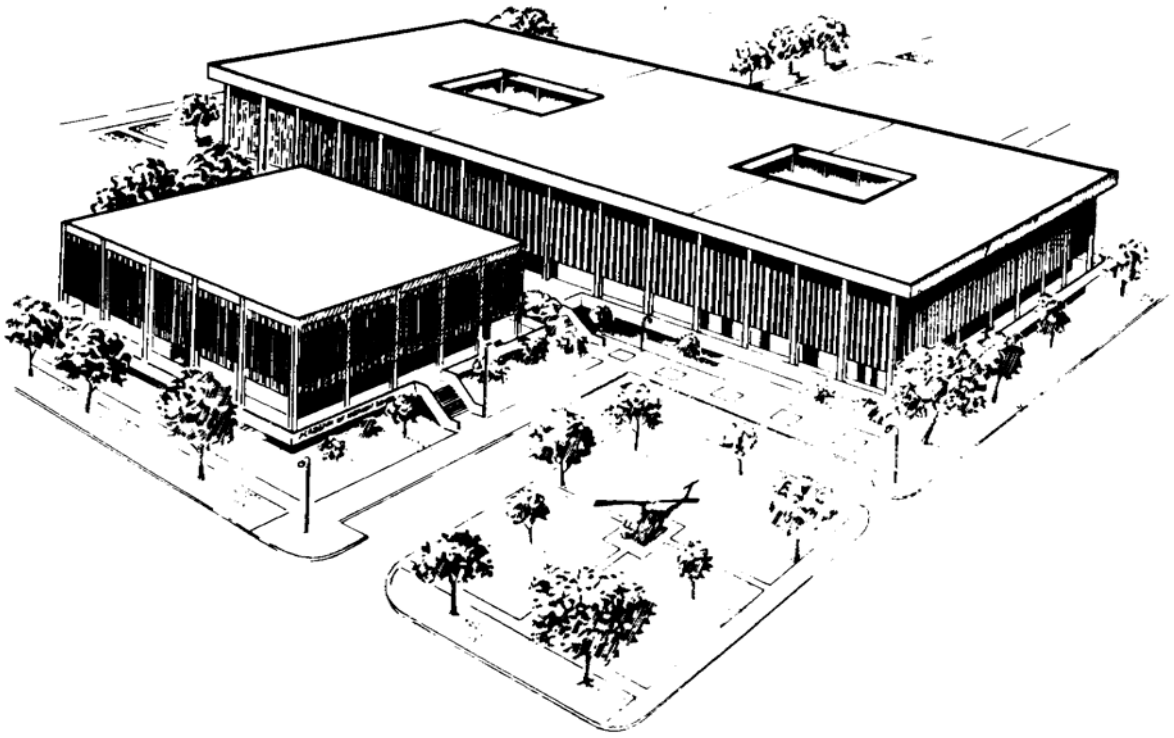
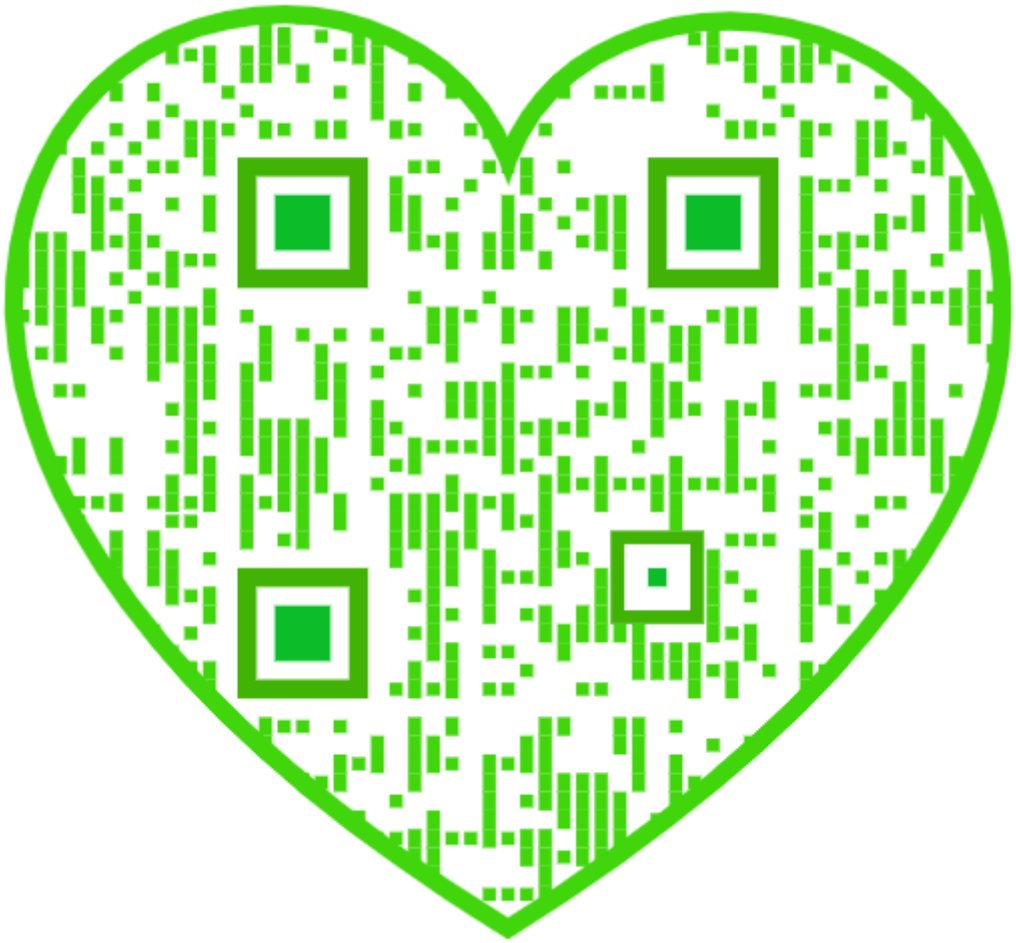


THE MUSCULOSKELETAL SYSTEM I

SUBCOURSE MD0577 EDITION 100



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CLARIFICATION OF TRAINING LITERATURE TERMINOLOGY

When used in this publication, words such as "he," "him," "his," and "men" are intended to include both the masculine and feminine genders, unless specifically stated otherwise or when obvious in context.

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SUBCOURSE MED0577

THE MUSCULOSKELETAL SYSTEM I

INTRODUCTION

The musculoskeletal system is composed of osseous (bone) tissue and muscle tissue. Both are essential parts of the complex structure that is the body. The skeletal system has a major role in the total structure of the body, but bones and joints alone cannot produce movement. Together, skeletal tissue and muscle tissue are important parts of the functioning of the body as a whole.
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Subcourse Components:

The subcourse instructional material consists of the following:

Introduction

Lesson 1, Diseases and Disorders of the Musculoskeletal System.

Lesson 2, Diseases and Disorders of the Feet.

Study Suggestions:

Here are some suggestions that may be helpful to you in completing this subcourse:

--Read and study each lesson carefully.

--Complete the subcourse lesson by lesson. After completing each lesson, work the exercises at the end of the lesson, marking your answers in this booklet.

--After completing each set of lesson exercises, compare your answers with those on the solution sheet that follows the exercises. If you have answered an exercise incorrectly, check the reference cited after the answer on the solution sheet to determine why your response was not the correct one.

Credit Awarded:

To receive credit hours, you must be officially enrolled and complete an examination furnished by the Nonresident Instruction Branch at Fort Sam Houston, Texas. Upon successful completion of the examination for this subcourse, you will be awarded 6 credit hours.

You can enroll by going to the web site http://atrrs.army.mil and enrolling under "Self Development" (School Code 555).

A listing of correspondence courses and subcourses available through the Nonresident Instruction Section is found in Chapter 4 of DA Pamphlet 350-59, Army Correspondence Course Program Catalog. The DA PAM is available at the following website: http://www.usapa.army.mil/pdffiles/p350-59.pdf.

NOTE--REFERENCES

There are many excellent references dealing with the musculoskeletal system.Here are two very good references commonly available in most libraries.

Caroline, N. L. Emergency Care in the Streets. (5th Ed.), Boston, MA: Little, Brown, 1995.

Memmler, R. The Human Body in Health and Disease. (8th Ed.), Philadelphia: J. B. Lippincott: 1995.

LESSON ASSIGNMENT

LESSON 1	Disease and Disorders of the Musculoskeletal System.
LESSON ASSIGNMENT	Paragraph 1-1 through 1-19.
LESSON OBJECTIVES	After completing this lesson, you should be able to:

1-1. Identify the causes of deviations from normal musculoskeletal functioning.

1-2. Identify the types of joint pain.

1-3. Define and identify the causes, signs/symptoms, and treatment for these musculoskeletal diseases:

Rheumatoid arthritis.
Osteoporosis.
Septic arthritis.
Gout.
Bursitis.
Tendinitis/tenosynovitis.
Spasmodic torticollis (wryneck).
Low back pain.
Ganglion.
Carpal tunnel syndrome.
Chondromalacia patellae.
Osteomyelitis.

SUGGESTION After completing the assignment, complete the exercises of this lesson. These exercises will help you to achieve the lesson objectives.

LESSON 1

DISEASES AND DISORDERS OF THE MUSCULOSKELETAL SYSTEM

Section 1. THE MUSCULOSKELETAL SYSTEM

1-1. INTRODUCTION

The musculoskeletal system is a complex system of bones, muscles, ligaments, tendons, and other connective tissue. It is this system that gives the body form and shape. This system is subject to a variety of diseases some of which are not well understood. As a medical noncommissioned officer (NCO), you will often need to distinguish the characteristics of musculoskeletal diseases.

1-2. CAUSES OF DEVIATIONS FROM NORMAL MUSCULOSKELETAL FUNCTIONING

Disease, defects, and trauma are the major causes of musculoskeletal system malfunction. Diseases such as arthritis, osteoporosis (imbalance between bone formation and reabsorption), and tumors interfere with proper musculoskeletal functioning. Other defects such as cysts and congenital problems can cause malfunctioning. Trauma to the body such as fractures, sprains, dislocations, subluxations, and strains also cause musculoskeletal system dysfunction.

Section II. JOINT PAIN

1-3. TYPES AND EXAMPLES

The skeletal system is made up of many separate bones held together at joints by flexible connective tissue. The movements that allow us to change position by moving the bony parts of our bodies occur at the joints (also called articulations). Joints are classified by function also taking into account the degree of movement the joint permits. Classified by function there are these types of joints: synarthroses (immovable joints), amphiarthroses (slightly movable joints), and diarthroses (freely movable joints). Additionally, joints are classified by connections: fibrous joints (no joint cavity and bones held together by connective tissue), cartilaginous joints (no joint cavity and bones held together by cartilage), and synovial joints (joint cavity and bones forming joint are united by accessory ligaments). Joints are subject to pain that can be classified as monarticular pain and polyarticular pain.

1-4. MONARTICULAR PAIN

Monarticular pain is pain that occurs in one joint. Causes of monarticular pain include:

a. **Mechanical Cause**. A direct blow to the joint will cause pain. Also, injuries to other body parts that are close to the joint may cause pain in the joint.

b. **Osteoarthritis**. This is the most common form of arthritis and is a deterioration of the joint cartilage and the formation of new bone at the margins and subchondral areas of the joints. Joint pain is the most common symptom of this condition.

c. **Tumors**. A tumor, an overgrowth of tissue, can occur at a joint. The tumor may be benign or malignant, causing pain in either case.

d. **Pyogenic Cause**. Pyogenic refers to a pus-forming infection. It can be acute (sudden onset) or chronic (ongoing but milder). In either case, if this occurs at a joint, there will be pain.

e. **Metabolic Cause**. Metabolism refers to the chemical processes taking place in the body's living tissues, processes needed to maintain life. Increased production of uric acid and calcium can result in joint pain.

f. **Avascular Necrosis Cause**. This refers to the death of tissue due to poor circulation, this tissue having no blood vessels

g. **Neuropathic Cause**. Joint pain can be associated with nervous system disease.

1-5. POLYARTICULAR PAIN

Here, pain occurs in several joints. Types of polyarticular pain include acute polyarticular pain and subacute pain. Conditions in which there is acute polyarticular pain include rheumatoid arthritis, systemic lupus erythematous, metabolic-caused joint pain, viral infection, and rheumatic fever.

a. **Rheumatoid Arthritis**. In this chronic, systemic, inflammatory disease, the joints are affected. Initially, the affected joints may only feel stiff when the individual gets up in the morning. Later, joints become painful and tender, especially joints of the wrists, knees, elbows, and ankles.

b. **Systemic Lupus Erythematous**. This is an inflammatory infectious tissue disease that bears some similarities to rheumatoid arthritis. Joint pain and stiffness are the first and most common symptoms of the disease.

c. **Metabolic Caused Joint Pain**. These disorders can produce monarticular and polyarticular pain.

d. **Viral Infection Process**. Diseases in this category range from the common cold and influenza to chicken pox, German measles, and herpes simplex. All are viral infections.

e. **Rheumatic Fever**. This fever characteristically follows a streptococcal infection. A common complaint among many patients is migratory joint pain.

1-6. SUBACUTE PAIN

This type of pain is chronic but does not have the characteristics of deformity of the area with the exception that there is swelling. Subacute pain can be a symptom of rheumatoid arthritis, systemic lupus erythematous, and metabolic-caused joint pain. Subacute pain can also be characteristic of ankylosing spondylitis, a progressive chronic disease of the small vertebral joints of the spine.

Section III. SPECIFIC MUSULOSKELETAL DISEASES

1-7. RHEUMATOID ARTHRITIS (RA)

Rheumatoid arthritis is a chronic, systemic, inflammatory disease that attacks outer body joints and the surrounding muscles, tendons, ligaments, and blood vessels. RA is characterized by recurrent inflammation involving the synovial joints or the lining of those joints. If untreated, fibrous tissue in the joints calcifies, and the patient is unable to move the affected joints. The cause of RA is unknown; however, one theory is that infectious, genetic, and endocrine factors help determine whether a person will develop rheumatoid arthritis.

a. **Stages of Rheumatoid Arthritis**. If RA is untreated, the inflammatory process in the joints progresses in four stages.

(1) Stage 1. Congestion and edema of the synovial membrane and joint capsule cause synovitis (inflammation of the membranes lining a joint).

(2) Stage 2. Pannus (thickened layers of granulated tissue) forms, covers, and invades cartilage, and finally destroys the joint capsule and bone.

(3) Stage 3. Fibrous ankylosis (abnormal immobility and fixation of a joint caused by the presence of fibrous bands between the bones forming the joint) takes place closing the joint and causing the joint to be immovable. It is in this stage that visible deformities can be seen.

(4) Stage 4. Fibrous tissue calcifies in this stage, and the affected joint becomes totally immovable.

b. **Signs/Symptoms of Rheumatoid Arthritis.** Included are the following:

(1) Easily fatigued and general feeling of being unwell.

(2) Persistent low-grade fever.

(3) Weight loss and general weakness. Anemia.

(4) Painful joint swelling.

(5) Subcutaneous nodules over bony prominences such as knuckles of the hand.

(6) Enlarged lymph nodes.

c. **Treatment of Rheumatoid Arthritis**. Initially, the patient must understand that this is a chronic disease necessitating a major change in life-style. The patient will need to learn how to perform daily activities without putting undue stress on arthritic joints. Follow this treatment:

(1) Instruct the patient to rest at specific periods of the day on a regular basis to control fatigue.

(2) Apply splints carefully to provide rest for painful joints.

(3) Refer the patient to a physical therapist--who can, among other things, teach the patient how to function without putting undue stress on his joints.

(4) Control the patient's pain by these methods.

(a) ASA--high dosage can be given. Salicylates reduce inflammation and relieve joint pain. Stop when the patient hears ringing in his ears. Most adults can tolerate 4-6 g daily.

(b) Nonsteroid anti-inflammatory medication can be given; for example, indomethacin (Indocin®)

(c) Gold compounds. These are effective against active joint inflammation only. Nonanalgesics can produce remission. Water soluble gold compounds can be given intramuscularly weekly.

(d) Moist heat. Hot soaks, paraffin baths, and whirlpool therapy are usually effective for patients with chronic arthritis.

1-8. OSTEOPOROSIS

Osteoporosis is a metabolic bone disorder. The rate of bone resorption accelerates at the same time the rate of bone formation slows down. The result is a loss of bone mass. The bones that are affected by this disease lose calcium and phosphate a salt that causes the bones to become porous, brittle, and abnormally vulnerable to fracture. This condition affects the entire skeletal system eventually allowing the spine to curve, the thorax to drop, and the ribs to fall on the pelvic rim.

a. **Cause of Osteoporosis**. Included are the following:

(1) A mild but prolonged lack of adequate calcium intake

(2) Decrease or loss of anabolic sex hormone (anabolism = formation of living tissue from simple substances).

(3) Bone atrophy (wasting and loss of function) of the hands, wrists, or feet following minor injuries. (Also called Sudeck's atrophy)

(4) Excess of catabolic hormones (body compounds which breakdown chemical substances into more basic parts).

(5) Malabsorption syndrome (body's ability to absorb nutritional elements is impaired).

b. **Signs/Symptoms of Osteoporosis**. Included are:

(1) Pain in the lumbar spine.

(2) Tendency to kyphosis (an exaggeration of the thoracic curve of the vertebral column resulting in a round-shouldered or hunched back appearance.

(3) Kidney stones from hypercalciuria (too much calcium in the urine).

c. **Treatment of Osteoporosis.** Follow these instructions:

(1) Follow a high protein diet, supplementary calcium, and multivitamin pills.

(2) Increase fluid intake.

(3) Sleep on a firm surface.

(4) Increase physical activity.

NOTE: Among the factors implicated in bone loss are a decrease in estrogen in women, calcium deficiency, malabsorption of calcium, vitamin D deficiency, loss of muscle mass, and inactivity.

1-9. SEPTIC ARTHRITIS (SA)

Septic arthritis is a medical emergency, a condition caused by bacteria invading a joint and then causing the synovial lining of the joint to become inflamed. The bacterial organisms can enter the joint cavity causing liquid from that cavity to escape into a body cavity; the liquid containing bacteria causes pus formation. Septic arthritis can lead to ankylosis (abnormal immobility and fixation of a joint). This disease can even be fatal if bacterial organisms enter the body systems.

a. **Signs/Symptoms of Septic Arthritis**. The onset of SA is sudden with these signs and symptoms: intense pain, inflammation swelling of the affected joint, and low-grade fever. SA can develop in any joint, but it usually attacks large joints and small peripheral joints.

b. **Treatment of Septic Arthritis**.

(1) Administer antibiotic therapy by phvsician's orders; for example, Gram-negative penicillin, gram-positive nafcillin, or gram-negative bacilli ampicillin.

(2) To relieve pain, you may give codeine or propoxyphene.

(3) Monitor progress of the patient by frequent analysis of joint fluid cultures, synovial fluid leukocyte counts, and glucose determinations.

1-10. GOUT

This condition is a metabolic disease characterized by an excess of uric acid in the urine. Gout usually occurs in the feet and legs and causes joints to be painfully arthritic.

a. **Normal Causes of Gout**. Normally, nucleic acids are catabolized, and uric acid is produced as waste. Some individuals produce too much uric acid while others excrete too little uric acid. In both cases, uric acid accumulates in the body and tends to solidify into crystals that are deposited in the joints and kidney tissue. Gouty arthritis is the term for the condition caused wthen these crystals are deposited in joints.

b. **Other Causes of Gout**. The tendency to gout can be inherited. Other causes of gout include renal problems (kidney problems) and overuse of diuretics. Dehydration and starvation make the condition worse. Individuals who have gout can be gout free for years. The condition is not necessarily constant.

c. **Signs/Symptoms of Gout.** Note the following:

(1) Sudden onset of severe pain in peripheral joints.

(2) Metatarsophalangeal joint of great toe (see figure 1-1) is most susceptible to gout.

(3) Affected joints are hot, tender, inflamed, dusky-red, or cyanotic.

(4) The patient may have a fever of 101ºF to 103ºF.

(5) Recurring episodes of gout attack the same joints.

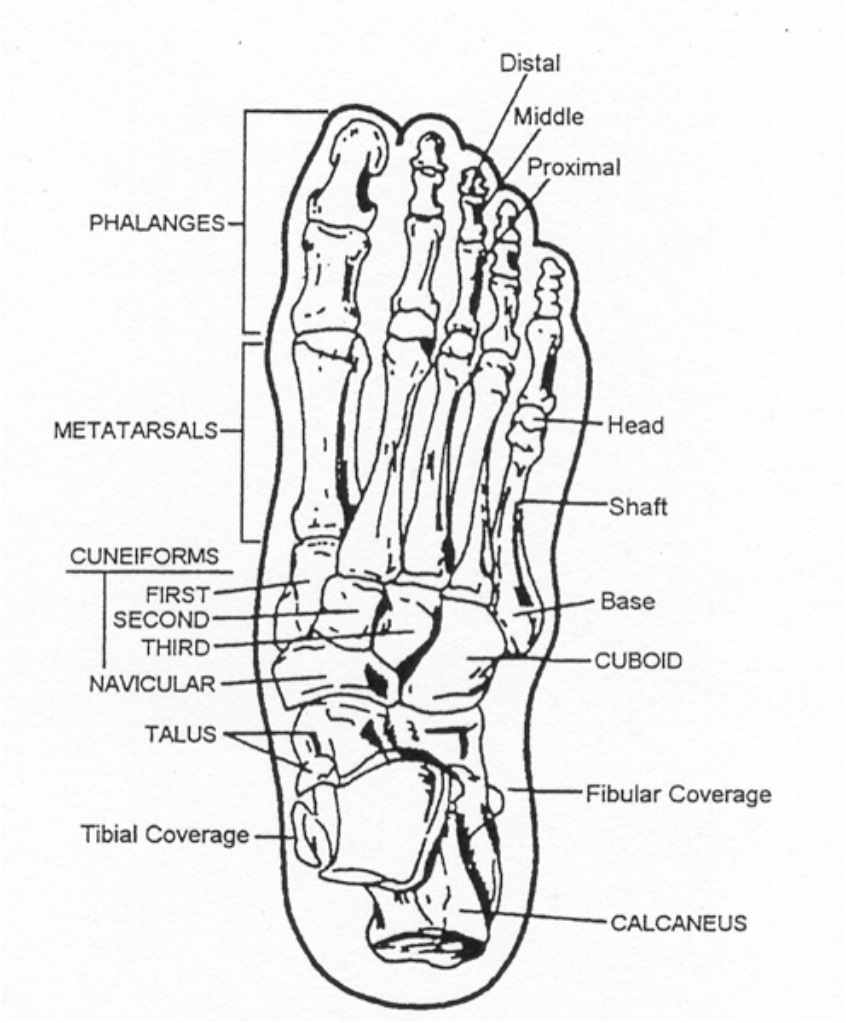

Figure 1-1. Metatarsophalangeal joint of great toe.

d. **Treatment of Gout**. Follow this treatment:

(1) Advise avoidance of alcohol and purine-rich foods.

(2) Encourage large fluid intake.

(3) By physician's order, may administer nonsteroidal anti-inflammatory indomethacin medication such as Indocin®.

(4) By physician's order, may give uriocsurics such as allopurinol (Zyloprim®) and colchicine.

NOTE: See paragraph 2-14 for more information about gout.

1-11. BURSITIS

a. **General Information**. The bursae are closed sacs lubricated by small amounts of synovial fluid. This fluid helps muscles and tendons move over bony prominences (pieces of bone that stick out). Bursitis is the inflammation of a bursa or of several bursae. When bursitis occurs, it usually occurs in these bursae: the subdeltoid, the olecranon, the trochanteric, the calcaneal, or the prepatellar bursae. These are all areas where tendons pass over bony prominences. Housemaid's knee is a typical example of bursitis.

b. **Causes**. Bursitis affects individuals who spend a great deal of time on their knees regardless of whether they do housework or some other type of endeavor. Additional causes of bursitis include trauma, an acute or chronic infection (including syphilis and tuberculosis), rheumatoid arthritis, and gout.

c. **Signs/Symptoms of Bursitis.** Included are the following:

(1) Pain at the affected site.

(2) Tenderness at the affected site.

(3) Limited range of motion.

(4) Swelling at the site.

(5) Redness at the site.

d. **Treatment of Bursitis**. Possible treatments include:

(1) Physical therapy. This prevents limiting adhesions from developing.

(2) By physician's orders, these procedures may be performed:

(a) Needle aspiration of joint. This procedure may be necessary to relieve pressure, to evacuate blood, or to get a fluid sample for laboratory studies.

(b) Intrabursal injection. Hydrocortisone and one percent procaine may be injected to relieve pain.

(c) Systemic corticosteriods may be injected to reduce inflammation.

1-12. TENDINITIS/TENOSYNOVITIS

These conditions are much the same. inflammation of the lining of the tendon sheath and the enclosed tendon surrounding certain joints. Wrists, shoulders. elbows (tennis elbow), finger joints (trigger finger), ankles, and associated tendons are affected.

a. **Signs/Symptoms of Tendinitis/ Tenosynovitis**. Included are:

(1) Swelling due to fluid accumulation.

(2) Fluid accumulation in the affected tendon sheaths.

(3) Inflammation of the tendons.

(4) Irregular contours of the tendons. Friction rubs.

(5) Pain on movement.

b. **Treatment of Tendinitis**. The same treatment is advised as for bursitis in paragraph 1-11d.

c. **Treatment for Tenosynovitis (Tennis Elbow)**. The goal is to relieve pain.

(1) By physician's orders, these medications may be given:

(a) Medications such as corticosteriods can be given.

(b) Aspirin or indomethacin for pain.

(2) Apply an immobilizing splint from the distal forearm to the elbow. (In two to three weeks, this treatment usually relieves pain.)

(3) Physical therapy such as manipulation and massage.

(4) Use a "tennis elbow strap" to relieve strain on the affected forearm muscles/tendons. Wrap the strap snugly around the forearm.

1-13. SPASMODIC TORTICOLLIS (WRYNECK)

Torticollis is the shortening of superficial and deep muscles of the neck. Spasmodic torticollis, also known as wryneck, refers to these muscles contracting spasmodically. Spasms. Spasms occur in the sternomastoid, trapezius, and other neck muscles. The result is that the head bends to the affected side, and the chin rotates to the opposite side. The head is in an unnatural position. Causes of this condition include basal ganglia disease, central nervous system infections, tumors in the bones or soft tissues of the neck, and psychological disturbances.

a. **Signs/Symptoms of Spasmodic Torticollis**. Signs and symptoms may occur suddenly or gradually. The condition affects males and females equally. The individual may find the condition occurring occasionally and mildly, or the condition may be permanent, causing a deformity in the person's posture.

b. **Treatment of Spasmodic Torticollis**. Follow this treatment:

(1) Remove local causes of the condition.

(2) Apply tactile pressure to the same side of the jaw as the head rotation.

(3) Refer the patient for psychiatric counseling.

1-14. LOW BACK PAIN

Pain that occurs in the low lumbar, lumbosacral, or sacroiliac region of the back is all termed low back pain.

a. **Cause of Low Back Pain**. Causes include the following:

(1) Degenerative joint disease of the lumbosacral area.

(2) Ruptured discs in the spinal column.

(3) Fractures, infection, and tumors of the back, pelvis, or retroperitoneum.

(4) Traumatic ligament rupture.

(5) Muscle tears.

(6) Congenital defects.

(7) Obesity.

(8) Pregnancy.

b. **Treatment of Low Back Pain**. Included are the following:

(1) Muscle relaxants such as methocarbamol (Robaxin®).

(2) Local heat on the affected area.

(3) Aspirin.

(4) Bed rest.

(5) Lumbosacral corset.

(6) Physical therapy.

1-15. GANGLION

A ganglion may be a collection of nerve cell bodies outside of the brain or the spinal cord. Here, the meaning is a cystic swelling resembling a tumor. This cystic swelling can occur on a tendon sheath or a joint capsule. Ganglions can be caused by contusions, repeated strains, or a weak area in a joint capsule or tendon sheath. Ganglions are most common in the wrist.

a. **Signs/Symptoms of Ganglion**. A firm lump or protrusion and a non-tender cyst are indications of a ganglion.

b. **Treatment of a Ganglion**. If the tumor is benign, leave it alone. It can be aspirated. If the ganglion is a cyst which is surgically removed, there is a fifty percent chance that the cyst will return.

1-16. CARPAL TUNNEL SYNDROME

This musculoskeletal condition is the most common of the trapped nerve syndromes. The median nerve at the wrist is compressed within the carpal tunnel. The median nerve, tendons, and blood vessels pass through the carpal tunnel at the wrist on the way to the fingers and thumb. The compression causes sensory and motor changes in the hand. The general population in- the 40 to 50 year age group is most likely to have this syndrome, and five times as many women have the condition as men. Carpal tunnel syndrome can develop during pregnancy. For those who use their hands strenuously (sustained grasping, twisting, or flexing the hands done by assembly line workers, for example), the disorder worsens.

a. **Signs/Symptoms of Carpal Tunnel Syndrome**. Symptoms are often worse at night and may be relieved if the patient shakes his hands vigorously or dangles his hands at his sides. Included are the following:

(1) Pain in the hands.

(2) Weakness in the hands.

(3) Paresthesia (abnormal sensation such as burning, tingling, numbness) in the hands.

(4) Eventually, pain may spread to the forearm and even the shoulders.

b. **Treatment**. Begin conservative treatment which is to splint the wrist in the neutral position at night. Try this for one to two weeks. If this treatment is unsuccessful, refer the patient to orthopedics.

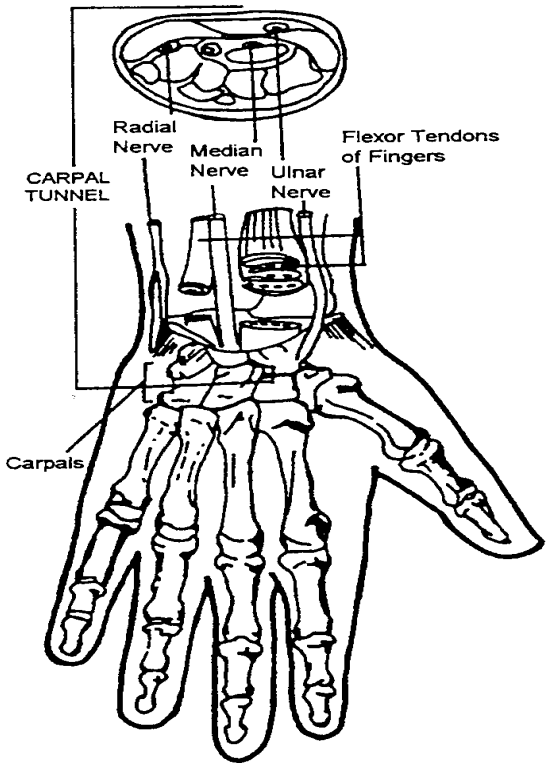

Figure 1-2. Carpal tunnel syndrome.

1-17. CHONDROMALACIA PATELLAE

Chondromalacia refers to an abnormal softening of cartilage. Chondromalacia patellae refers to the rapid erosion and fragmentation of cartilage around the knee. The condition is most common in young men. There may be a momentary "catching" of the knee while climbing stairs. Passive motion is not painful.

a. **Signs/Symptoms of Chondromalacia Patellae.** Included are the following:

(1) Compression of the patellae (kneecap) is painful.

(2) A grating sound is heard when the patella is palpated.

b. **Treatment of Chondromalacia Patellae**. Rest is the first treatment. Surgery may be necessary to remove articular cartilage.

1-18. OSTEOMYELITIS

This condition is an inflammatory process involving the bone. Osteomyelitis can be chronic or acute and is a pus-producing bone infection. Causes of osteomyelitis include disease-causing bacteria, lesions, trauma, and sickle cell anemia.

a. **Signs/Symptoms of Osteomyelitis**. Included are the following:

(1) Fever.

(2) Malaise.

(3) Localized pain.

(4) Swelling.

(5) Weakness.

(6) Surrounding tissue dies.

b. **Treatment of Osteomyelitis**. Treatment includes administering large doses of antibiotics intravenously and bed rest.

1-19. CLOSING STATEMENT

Musculoskeletal diseases are common and many are chronic requiring long-term or minimally effective therapy. The diseases studied in this lesson are common in all populations and will require medical and/or surgical treatments which you may need to directly or indirectly provide.

Continue with Exercises

EXERCISE, LESSON 1

INSTRUCTIONS. Complete the following exercises by writing the word or term that properly completes the incomplete statement or by writing the answer in the space provided at the end of the exercise.

After you have completed all the exercises, turn to the "Solution to Exercise" at the end of the lesson and check your answers.

1. List the five parts of the musculoskeletal system.

   a. _____.

   b. _____.

   c. _____.

   d. _____.

   e. _____.

2. List three major causes of musculoskeletal system malfunction.

   a. _____.

   b. _____.

   c. _____.

3. Monarticular pain is pain that occurs in _____.

4. Polyarticular pain is pain that occurs in _____.

5. Pain with a pyogenic cause is pain resulting from _____.

6. Rheumatoid arthritis, systemic lupus erythematous. and ankylosing spondylitis are all examples of _____ pain.

7. List three signs/symptoms of rheumatoid arthritis.

   a. _____.

   b. _____.

   c. _____.

8. Osteoporosis is a metabolic bone disorder in which the rate of bone resorption accelerates at the same time that the _____.

9. A high protein diet, _____ fluid intake, sleeping on a firm surface, and _____ are treatments for osteoporosis.

10. Bacteria invading a joint and causing the synovial lining of the joint to become inflamed is a description of the disease _____.

11. Gout is characterized by _____
    _____.

12. Needle aspiration of a bursitis sufferer's joint may be necessary for the following three reasons:

    a. _____.

    b. _____.

    c. _____.

13. The goal in the treatment of tennis elbow (tenosynovitis) is _____.

14. In the condition _____, superficial and deep neck muscles contract spasmodically causing the head to bend to one side and the chin to rotate to the opposite side.

15. Ruptured discs in the spinal column; fractures. infections, and tumors of the back, pelvis, or retroperitoneum; and degenerative joint disease of the lumbosacral area can all cause _____.

16. The individual has a benign ganglion. What is the treatment?
_____

17. If the median nerve of the wrist is compressed within the carpal tunnel, an individual may suffer from _____.

18. Rapid erosion and fragmentation of cartilage around the knee are characteristic of _____.

19. Osteomyelitis, condition caused by a pus-producing infection, is best treated by _____ and bed rest.

20. List the three regions of the back in which low back pain occurs.

    a. _____.

    b. _____.

    c. _____.

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES, LESSON 1

1. Bones.
   Muscles.
   Ligaments.
   Tendons.
   Connective tissue. (para 1-1).

2. Disease.
   Defects.
   Trauma. (para 1-2).

3. One joint. (para 1-4).

4. Several joints. (para 1-5).

5. A pus-forming infection. (para 1-4d).

6. Subacute. (para 1-6).

7. Any three of the following:
   Easily fatigued.
   General feeling of being unwell.
   Weight loss.
   General weakness.
   Anemia.
   Painful joint swelling.
   Subcutaneous nodule over bony prominences.
   Enlarged lymph nodes. (para 1-7c)

8. Rate of bone formation slows down. (para 1-8).

9. Increased; increased physical activity. (para 1-8b).

10. Septic arthritis (para 1-10).

11. Uric acid accumulating in the body and tending to solidify into crystals that are deposited in the joints and kidney tissue. (para 1-10a).

12. Relieve pressure.
    Evacuate blood.
    Obtain a fluid sample for laboratory studies. (para 1-11d)

13. To relieve pain. (para 1-12c).

14. Spasmodic torticollis. (para 1-13).

15. Lower back pain. (para 1-14a).

16. Leave it alone. (para 1-15b).

17. Carpal tunnel syndrome. (para 1-16).

18. Chondromalacia patellae. (para 1-17).

19. Administering large doses of antibiotics intravenously. (para 1-18b).

20. Low lumbar.
Lumbosacral.
Sacroiliac. (para 1-14).

End of Lesson 1

LESSON ASSIGNMENT

LESSON 2	Diseases and Disorders of the Feet.
LESSON ASSIGNMENT	Paragraph 2-1 through 2-29.
LESSON OBJECTIVES	After completing this lesson, you should be able to:

2-1. Identify definitions for common diseases and disorders of the feet.

2-2. Identify the signs/symptoms for common diseases and of the feet.

2-3. Identify the treatments for common disorders of the feet.

SUGGESTION After completing the assignment, complete the exercises of this lesson. These exercises will help you to achieve the lesson objectives.

LESSON 2

DISEASES AND DISORDERS OF THE FEET

Section I. SKELETAL AND MUSCULAR STRUCTURE OF THE FEET

2-1. INTRODUCTION

Problems affecting the feet, even if minor, can be disabling. Your understanding of such problems and their treatments can be quite valuable in relieving pain and suffering and upgrading a unit's efficiency and readiness.

2-2. GENERAL CONSIDERATIONS

The feet are subject to a wide range of system diseases and disorders that are also common to other body parts. These diseases and disorders are vascular, musculoskeletal, or nervous in nature. The feet are particularly prone to diseases and disorders brought about as a result of pressure or fungal infection. Look at figures 2-1 through 2-7 that show the skeletal and muscular structure of the feet for an understanding of the foot problems in this lesson.

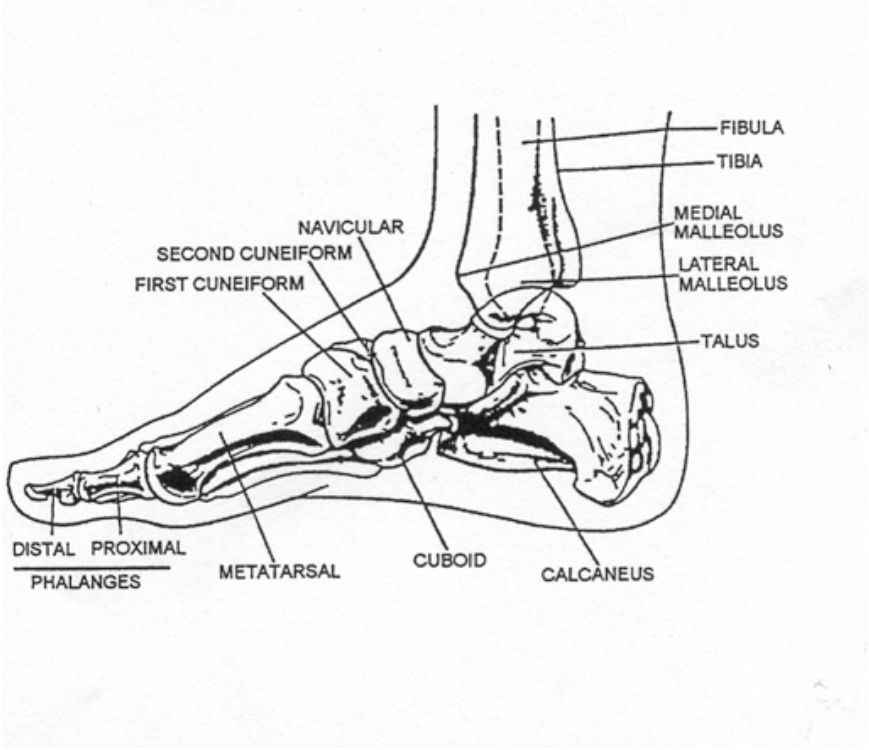

Figure 2-1. Side view of the right foot.

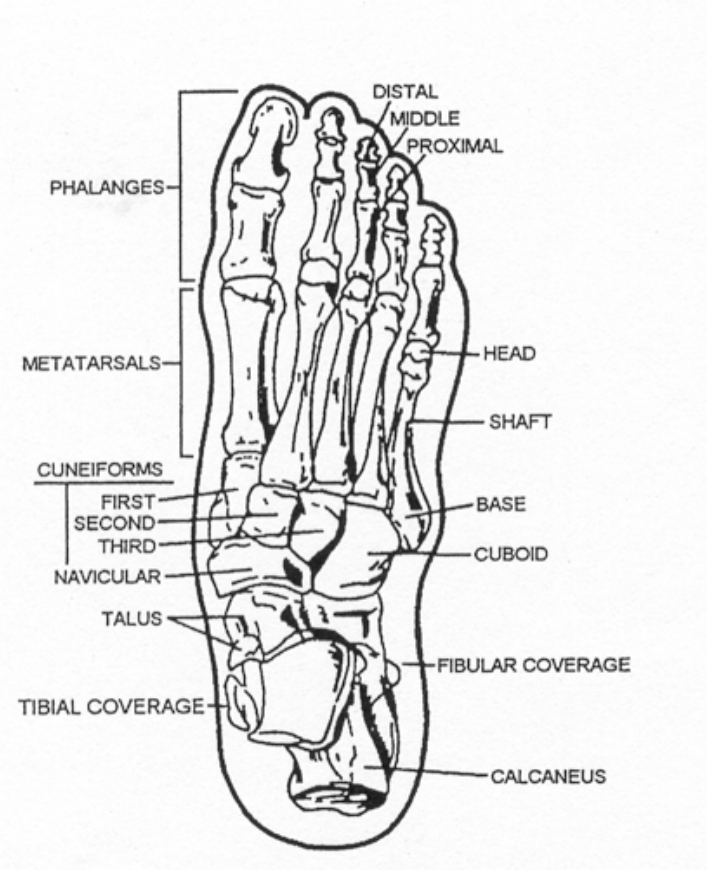

Figure 2-2. Top view of the right foot.

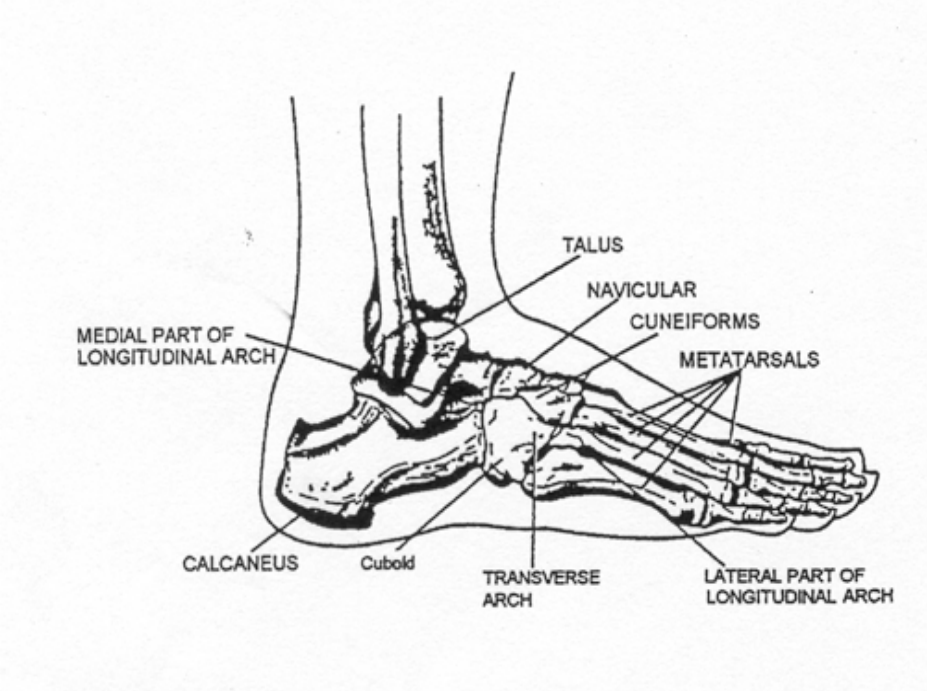

Figure 2-3. Front view of superficial muscles that move the foot and toes.

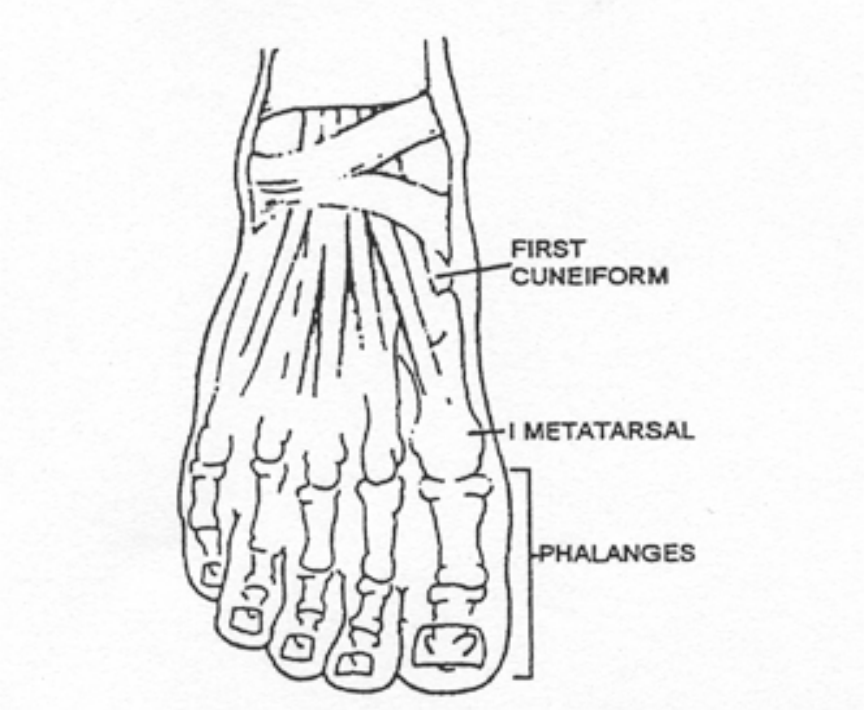

Figure 2-4. Front view of superficial muscles that move the foot and toes.

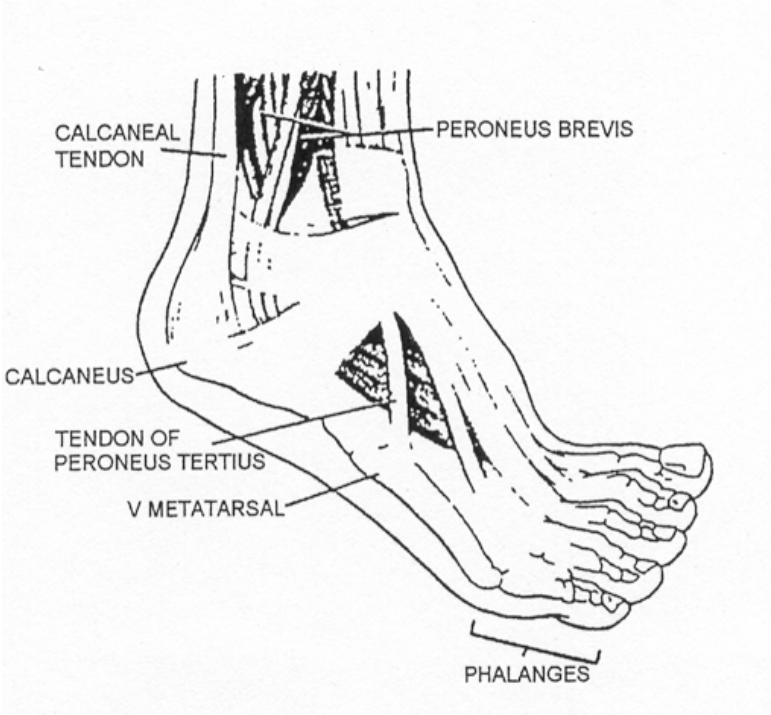

Figure 2-5. Top side view of superfacial muscles that move foot/toes.

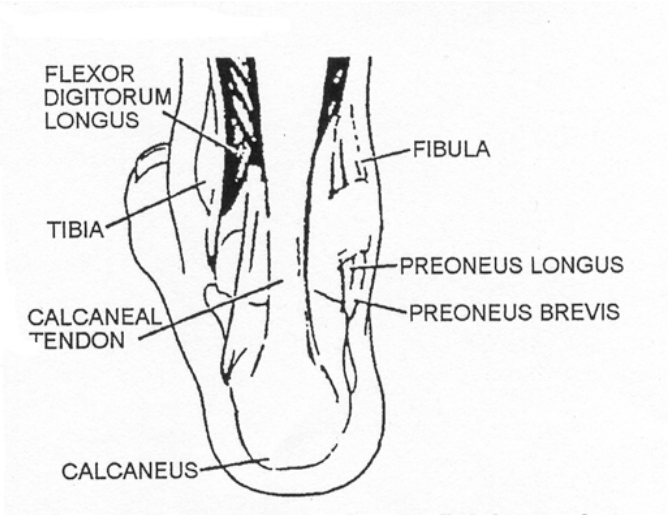

Figure 2-6. Back view of superficial muscles that move the foot and toes.

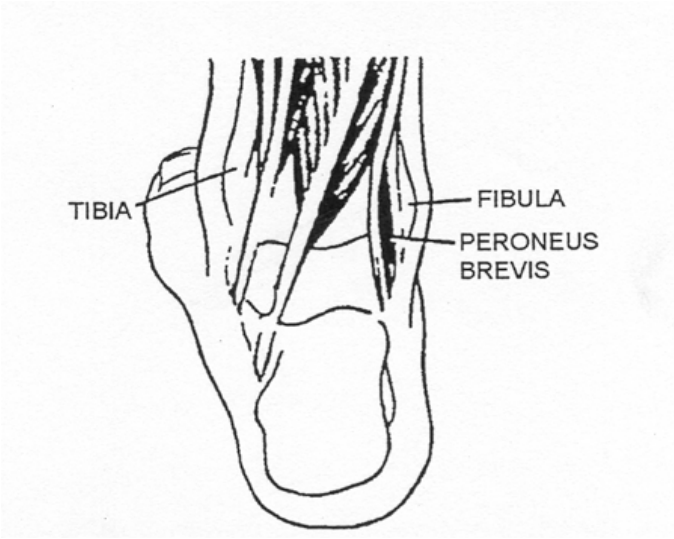

Figure 2-7. Back vie of deep muscles that move the foot and toes.

2-3. HEEL WEAR AND TEAR

a. **Daily Activities and the Heel**. Smaller than a golf ball, the heel (calcaneus bone) is the largest bone in the foot and withstands much wear and tear from our daily activities. Soft protective tissue about 3/8ths of an inch thick lies between the bone and the sale of the foot. This tissue wears down easily. Running places a great deal of strain on the heel. A person running places three times his weight on his heel. This pounding of the heel on a hard surface such as the pavement or firm ground can be compared to the pounding of a sledgehammer against an unyielding surface.

b. **Heel Pain**. It is no wonder, then, that there are foot disorders of the heel. The first indication of a foot disorder of the heel may be pain. An individual may feel pain on the plantar surface of the heel (the sole of the heel). Such pain is usually caused by strain at the periosteal attachment of the plantar fascia and the flexor digitalis brevis. (See figures 2-4, 2-5, and 2-6.)

c. **Types of Heel Disorder**. There are several types of foot disorders of the heel. Included are the calcaneal spur syndrome (fig 2-8), calcaneal fat pad displacement, Sever's disease, Haglund's deformity, retrocalcaneal space pain, and metatarsalgia pain.

2-4. CALCANEAL SPUR SYNDROME (HEEL SPUR)

A calcaneal spur is a bony growth from the plantar surface (sole of the foot) of the calcaneus (heel bone).

a. **Pain**. Also called a heel spur, this spur can cause an individual pain when he walks. The spur grows forward in the direction of the plantar fascia. The individual may have no specific symptoms, except for pain.

b. **Treatment**. The spur is treated with corticosteroids and lidocaine injections. Treatment is as follows:

(1) Administer one ml of 10 mg triamcinolone acetonide in 1.5 ml of 2 percent lidocaine with epinephrine.

(2) Strap to relieve strain.

(3) Refer the patient to podiatry for biomechanical evaluation.

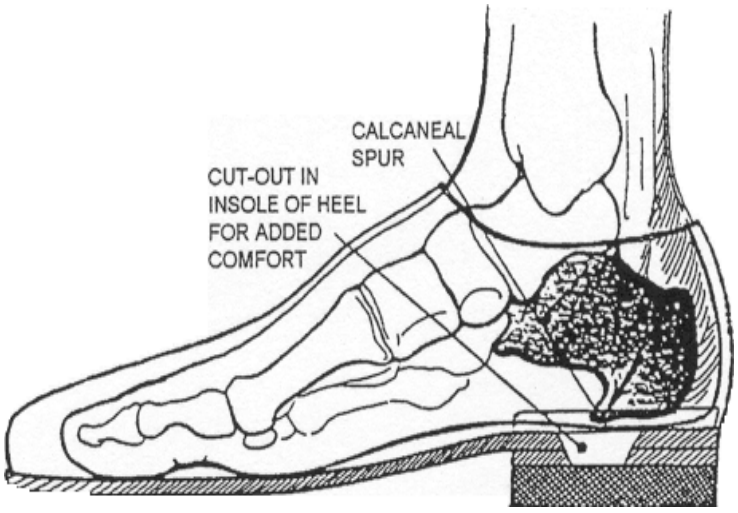

Figure 2-8. Calcaneal spur syndrome.

2-5. CALCANEAL FAT PAD DISPLACEMENT

Inversion (turning in) or eversion (turning out) of the rear area of the foot causes this disorder. Rear area of the foot inversion or eversion causes the calcaneal fat pad (the pad you can feel under the heel of the foot) to be displaced. Then, the foot's calcaneus and surrounding soft tissue that cushion the heel of the foot in the shoe transfer the weight of the body to a spot toward the middle of the foot. Heel cushions, sponge rubber, and lamb's wool can be put in the shoe to cushion the heel.

2-6. SEVER'S DISEASE

In this disease, pain occurs at the margins of the heel. The calcaneus is the only bone in the tarsus that develops from two centers of ossification. Excessive strain in the epiphysis may cause a break in the cartilaginous union between the bones. Those who suffer from this disease are usually children between the ages of 8 and 16. Jumping or other athletic activities in which the children participate have placed too much strain on the epiphysis.

a. **Signs/Symptoms of Sever's Disease**. Signs and symptoms of the disease may include heat and swelling. Other indications of the disease are the age of the patient, a history of athletic activity, and pain along the margins of the heel. It may take several months for symptoms to develop.

b. **Treatment.** Treatment includes putting heel pads in the shoe to keep the heel from pulling the Achilles tendon. Another treatment is immobilizing the foot in a plaster cast. Most important is reassuring the patient.

2-7. HAGLUND'S DEFORMITY

In Haglund's deformity, pain occurs at the back of the heel. This foot problem is sometimes referred to as bursitis of the heel or "pump bump." A bursa (sac or pouch of fluid located at friction points, especially about the joints) develops over the posterior superior lateral calcaneus between the tendon and the skin. In other words, an abnormal clump of tissue forms at the back of the heel just over the bone. This condition is in two types of feet: feet with very high arches and feet with very low arches. The direct cause of the bump or deformity is a shoe rubbing up and down on the back of the heel. The foot area, consequently, is continually irritated and may develop not only a bump but an inflamed, fluid-filled bursal sac.

a. **Signs/Symptoms of Haglund's Deformity**. Included are the following:

(1) A small red, slightly hardened area of tissue that is tender. The area is located at the posterior superior aspect of the heel.

(2) A painful red lump that has developed over the tendon when the inflamed bursa gets bigger. There should be no pain until the bump becomes inflamed.

(3) Swelling which extends on both sides of the tendon.

b. **Treatment of Haglun's Deformity**. Treat as follows:

(1) Apply warm heat (a wet face towel, for example) to ease pain. Do this several times a day.

(2) Be careful when you buy shoes. Heel pads can be placed in a shoe to lift the individual's heel up higher in the shoe. Shoes that have soft edges are more comfortable. A shoe with a hard edge will very often be very uncomfortable.

2-8. RETROCALCANEAL SPACE PAIN

This pain occurs in the heel and is caused by a fracture of the posterior lateral tubercle of the talus. The result is injury to the plantar flexion. Those who walk on their toes have developed elongated talar tubercles and are most apt to experience this type of injury.

a. **Signs/Symptoms of Retrocalcaneal Space Pain**. Included are the following:

(1) Swelling behind the ankle at the retrocalcaneal space between the Achilles tendon and the calcaneus.

(2) Pain that increases on dorsiflexion (turning the foot and toes upward).

b. **Treatment for Retrocalcaneal Space Pain**. First, have lateral X-rays of the ankle taken to aid in diagnosis. Then, immobilize the foot in a plaster cast for four to six weeks. Corticosteroids and anesthetic combinations may be given for pain. Use surgical excision if conservative therapy is not effective.

Section III. METATARSALGIA DISORDERS

2-9. INTRODUCTION

The word metatarsalgia is a general term used to describe pain over the metatarsus (the ball of the foot). Metatarsalgia foot disorders are problems associated with pain over the ball of the foot. Examples of such disorders include Morton's syndrome and variations of Morton's neuroma.

2-10. MORTON'S SYNDROME

This foot disorder is a congenital insufficiency of the first metatarsal segment of the foot, characterized by pain and tenderness in the ball of the foot. (See figure 2-1)

2-11. MORTON'S NEUROMA

Neuromas or neuralgia develop at interdigital nerves. Interdigital nerves of the foot travel beneath the metatarsals extending distally over the ball of the foot to innervate the toes.

NOTE: Neuroma is a tumor or new growth made up largely of nerve cells and nerve fibers. Neuralgia is paroxysmal (sudden and violent) pain.

a. **Signs/Symptoms of Morton's Neuroma**

(1) Early signs and symptoms of this foot disorder include a mild ache or discomfort in the area of the head of the 4th metatarsal.

(2) Sometimes, the person may only feel a burning sensation or tingling in the toes.

(3) As the condition progresses, the patient may feel a burning sensation in the tips of the toes.

(4) The patient sometimes feels as if he has a marble or pebble inside the ball of his foot when he wears any type of footgear.

b. **Treatment**.

(1) Conservative treatment includes administering lidocaine for a simple case of neuralgia as well as the use of foot orthoses (orthopedic apparatus used to support, align, prevent, or correct deformities).

(2) If such treatment does not work, surgical incision of the neuroma often gives complete relief from pain.

Section IV. ARTHRITIS OF THE FEET

2-12. INTRODUCTION

Arthritis is a disease that attacks the joints. The disease has the potential of causing the patient pain and/or deformity. In arthritis of the feet, the cartilage and lining of joints become inflamed. Arthritic feet are particularly susceptible to pain because feet have cartilage and some key joints.

a. **The Beginning of Arthritis of the Feet**. The number of synovial cells that line a joint increases. This causes the joint to become enlarged and thickened. These cells produce fluid.

b. **The Next Step--Fluid.** Now that there are too many cells, too much fluid is produced. The fluid accumulates in the tissues and causes swelling to occur in the joint.

c. **Other Problems Occur**. As the layers of synovial cells increase, other problems begin including inflammation of the cartilage and joint lining. Arthrosis of the feet occurs when damage and wear on the feet affect the cartilage surfaces of moveable joints.

2-13. RHEUMATOID ARTHRITIS

Rheumatoid arthritis (RA) is a disease that affects the synovium (lining of the joints). The small joints of the feet, the metatarsal joints, and the toes are often affected by RA. This disease can strike at any age. The exact cause is unknown, but emotional stress has been known to trigger the disease. Swelling, pain, and warmth in the affected joints are symptoms of RA. For best results, treatment should be started early; otherwise, the disease can be crippling and disabling to the patient.

2-14. GOUT

Paragraph 1-10 discusses gout as a musculoskeletal disease. Some information about gout is appropriate here because of its relation to arthritis. Gout may be described as an arthritis-associated disease that can attack the big toe of the foot.

a. **History of Gout**. This disease, first described by Greek and Roman physicians, was known to Hippocrates in the 5th century B.C. In that century, Byzantine physicians treated gout with colchicine, a drug that is still used to treat joint pain. Gout became well known in the Middle Ages when King Henry VIII of England was afflicted with the disease. It was known as the disease of the wealthy because it was associated with fatty diets and alcohol, items only the rich could afford.

b. **Gout Today.** Gout is common today and may be aggravated by an overly rich diet. The cause is too much uric acid in the body from faulty kidney functioning. The body does not process protein properly; therefore, uric acid builds up in the joint spaces. This disease is thought to be hereditary in 10 or 20 percent of the cases. See paragraph 1-10 for signs and symptoms of gout as well as treatment of gout.

2-15. SIGNS/SYMPTOMS OF ARTHRITIS OF THE FEET

Included are the following:

a. Stiffness.

b. Tension in the joints.

c. Pain.

d. Grinding and grating sound from joints.

e. Bulging bone formation. Restriction of movement.

2-16. TREATMENT FOR ARTHRITIS OF THE FEET

Treat by applying heat such as warm baths, short wave diathermy (heat by electric current applied to an area of body tissues), and microwave diathermy. Other possible treatments include antirheumatic preparations, hormones, drugs, bed rest, and supportive devices. In some cases, surgery to immobilize the affected joint is necessary.

2-17. PES PLANUS (FLATFOOT)

Today, the term "flatfoot" is used to describe a foot that is normally flat from birth. (see figure 2-9). In years past, a flat foot was considered inferior, and the United States Army (US Army)routinely rejected men with flat feet as being unfit for military service.

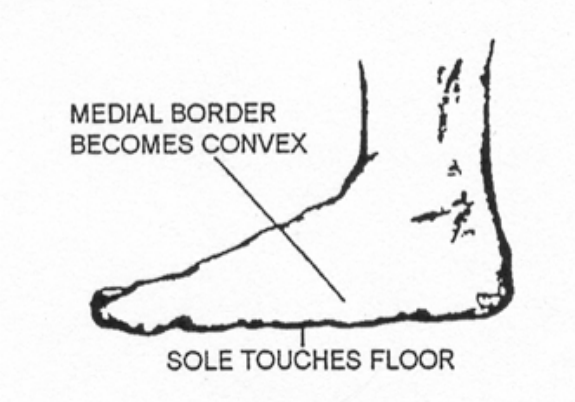

Figure 2-9. Pes planus (flatfoot).

a. **Dissimilarity of Flatfoot**. Research reveals that individuals born with flat feet are well suited to marching in contrast to some people who have higher arches. The higher arched feet sometimes collapse under rigorous strain. The flat foot condition in which the heel has turned outward and the medial longitudinal arch has lowered can be a problem. The individual with this condition has not been born with low arches and may have foot problems such as weak ankles and/or collapsed foot ligaments.

b. **Signs/Symptoms of Flatfoot**. The signs and symptoms of flat feet include pain in the longitudinal arch and pain behind the medial malleolus. Treat with arch supports, warm footbaths, and aspirin.

2-18. HELOMA DURUM (HARD CORN)

A corn may be defined as a hard, thickened area of skin located on top of, on the tip of, or between the toes. This skin has a different texture than normal skin; the skin is round and yellow like a kernel of corn. If the skin is reddish, the corn is inflamed. The central core of the corn descends into the flesh in a cone-shaped point killing all the normal cells in its way. The corn grows faster if it keeps rubbing against a shoe because the rubbing provides a constant source of blood to the area. Corns are protective in that they are the body's response to friction and pressure. The hard layers of the corn are trying to protect the skin and the bone beneath from bruises and injuries.

a. **Signs/Symptoms of Hard Corns**. Included are:

(1) Tenderness to pressure.

(2) Pain after release of pressure. Glassy core.

(3) Occurs over prominent protuberances.

(4) Commonly occurs over a plantar wart.

b. **Treatment of Hard Corns.** Treat as follows:

(1) Have the patient wear properly fitted shoes.

(2) Soften the wart with wet soaks.

(3) Debride the overgrowth with a number 10 blade.

(4) Debride the core with a number 15 blade.

2-19. HELOMA MOLLE (SOFT CORNS)

This condition is a localized overgrowth between the fourth and fifth toe. Soft corns (see figure 2-10) are fairly common and indicate a friction problem between the foot and shoes as for hard corns.

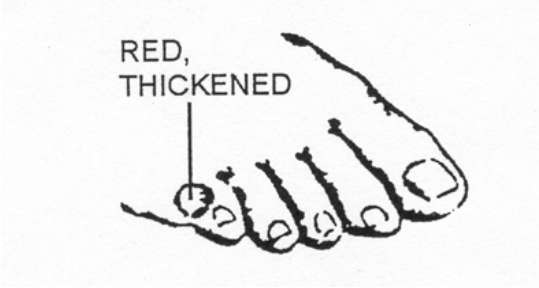

Figure 2-10. Corn.

a. **Signs/Symptoms of Soft Corns**.

(1) Infection.

(2) Moisture.

(3) May develop in a cyst.

b. **Treatment of Soft Corns**. To treat soft corns, place a pad between the toes to separate them. Debride the corns.

2-20. INGROWN TOENAIL

An ingrown toenail (figure 2-11) curves inward with no free spaces at the margins. The sides of the toenail cut into the skin around the nail causing that area to become very sensitive to pressure. The side of a shoe pressing against the area is painful. What has happened is that the soft tissue of the big toe, for example, is reacting to the ingrown nail as if the nail were a foreign body.

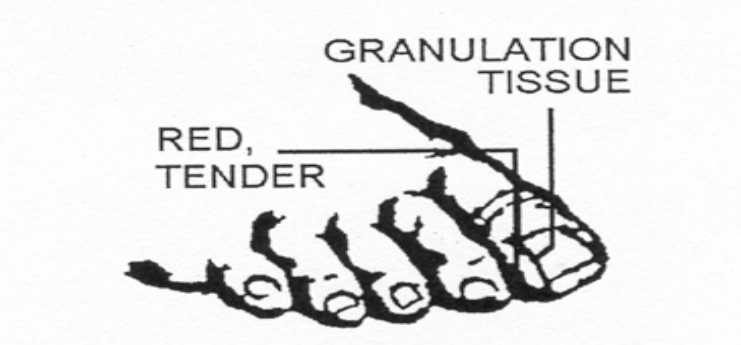

Figure 2-11. Ingrown toenail.

a. **Signs/Symptoms of Ingrown Toenail**

(1) Tenderness.

(2) Pain.

(3) Redness.

(4) Swelling.

(5) Infection.

(6) Death of surrounding tissue.

Treatment of Ingrown Toenail. Keep the affected area dry. Surgery may be necessary. Surgical treatment is as follows:

(1) Anesthetize the side and base of the toe

(2) Make an incision of the nail incurvation without cutting into the epidermal tissue.

(3) After the incurvation is removed, put a solution of 88 percent carbolic and phenol acid on the remaining nail. If phenol gets on the surrounding tissue, sponge off with alcohol.

(4) Dress the site with Cortisporin® ointment and put on a compress for 24 hours.

2-21. VESICLES AND BULLAS (BLISTERS)

Vesicles and bullas are closed, circumscribed, elevated lesions that contain fluid (serous fluid). A vesicle is a blister that is one centimeter or less in size while a bulla is a blister that is larger than one centimeter. Friction between a shoe or boot and the skin causes a blister to form. The size of the blister depends on how much friction is placed against the foot. Blisters usually develop on the ball of the foot, the back of the heel, or the tops of the toes. A blister is really a protective device. The formation of a blister tells the person that footwear is rubbing too much against a particular part of the foot.

a. **Signs/Symptoms of Vesicles/ Bullas**. Included are the following:

(1) Pain.

(2) Redness.

(3) Swelling.

(4) Infection if lesions have broken.

b. **Treatment of Vesicles/Bullas**. Treat as follows:

(1) Do not open lesions.

(2) Apply moleskin.

(3) Use open air treatment.

(4) Change socks frequently.

(5) Apply topical antimicrobial medications if the blister is open.

(6) Use the two-sock method of prevention of such lesions.

c. **Prevention of Vesicles/Bullas**. Blisters can be prevented. The key to success is to be sure that you find shoes that fit your feet properly. Next, wear socks that fit well and practice the two-sock method of keeping the feet dry. Socks will prevent friction between the skin and shoes, especially when a person is walking or jogging.

2-22. VERRUCAE (PLANTAR WARTS)

These lesions are common benign skin tumors caused by a virus the body has not been able to fight off. These bumps are spongy, sometimes thickened, and scaly lesions. Warts can appear anywhere on the skin. They can be particularly painful if they occur on the soles of the feet because the soles of the feet bear the weight of the body. The scientific name for a wart is verruca. When the wart occurs on the bottom of the foot (figure 2-12), the wart is called plantar verruca. This term simply gives the location of the wart, plantar meaning having to do with the sole of the foot.

a. **Types of Plantar Warts**. Even on the feet, all warts are not the same.

(1) One type of plantar wart is the single isolated wart. This wart can range from a tiny dot to a bigger, callused, blotch two to three centimeters in diameter.

(2) The second type of plantar wart is the mother-daughter group. The first and larger wart is called the "mother," and the warts which appear around this original wart are sometimes referred to as "daughters."

(3) The third and last type of plantar wart is the mosaic plantar wart. This is a cluster of many warts grouped together often appearing over the balls of the feet.

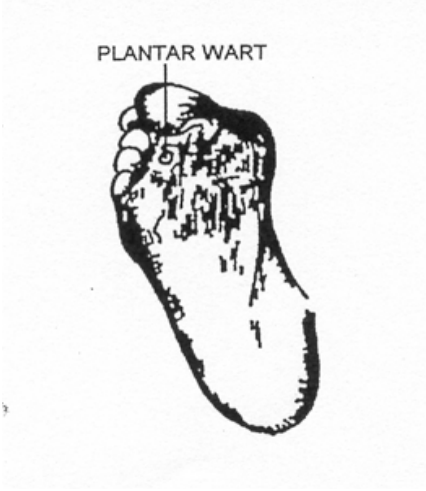

Figure 2-12. Plantar wart.

b. **Signs/Symptoms of Plantar Warts**. Included are the following:

(1) Tenderness.

(2) Pain.

(3) Pinpoint bleeding.

(4) Central core.

(5) Flattened tumors surrounded by cornfield epithelium.

NOTE: Plantar warts are the same as warts on the hands, the only difference being the location of the wart on the feet.

c. **Treatment of Plantar Warts**. There are many ways to treat warts, from covering the wart with a clove of garlic to laser treatment. Here is the AMEDD procedure to be followed:

(1) Freeze the wart with liquid nitrogen.

(2) Pare wart until bleeding or pain occurs.

(3) Apply a solution of 40 percent salicylic acid plaster and keep this in place for one week.

(4) Remove debris.

(5) Repeat paring, applying solution, debriding until the plantar warts are gone.

(6) Use foam pads in boots to relieve pressure and prevent recurrence.

2-23. PSYCHOSOMATIC FOOT DISORDERS

An individual with a psychosomatic illness has physical symptoms that have a psychological or emotional origin ("p*sycho"* means mind and "*soma"* means body).

a. **Studies of Psychosomatic**. Studies have revealed that the mind and the body are not separate. What affects the mind often affects the body. It is common for a person to have a headache after quarreling with someone or to have to urinate frequently before an examination. More serious psychosomatic illnesses include peptic ulcer, eczema, colitis, and bronchial asthma. Foot diseases may also be included in a listing of these illnesses that are caused by psychological or emotional stress; for example, some skin diseases of the feet.

b. **Signs/Symptoms of Psychosomatic Disorders**. Treating the symptoms may relieve the condition and soothe the patient, but only treating the symptoms will not solve the problem. The patient must have psychoanalytic help to understand his problem. Remember that the patient with a psychosomatic illness is really sick. He is not pretending or imagining his symptoms; therefore, he cannot just turn off his illness at will. Be careful not to belittle or make fun of him when you are treating him or making arrangements for him to be treated elsewhere. Such treatment will not help the patient get well.

2-24. STRESS FRACTURES

A fracture is the breaking of a bone chipping, cracking, splintering, or complete break. A stress fracture is not a complete break but repeated force on a bone, eventually resulting in mechanical failure. A march fracture, common in recruits, is a good example of a stress fracture. A march fracture is a spontaneous stress fracture of the second, third, or fourth metatarsal shaft. Severe strain is usually the cause. Soldiers who have been on long marches often experience march fractures.

a. **Signs/Symptoms of Stress Fractures.** Included are the following:

(1) Point tenderness.

(2) Redness and swelling (if the bone involved is superficial).

(3) Pain develops slowly, in many cases.

(4) X-ray is often inconclusive; however, comparison of x-rays taken at different times may confirm the diagnosis of a fracture.

b. **Treatment of Stress Fractures**. Treat as follows:

(1) Splint the foot with a rigid padded board splint, an air splint, a pillow splint, or an improvised splint of some other material. The purpose of the splint is to immobilize the ankle joint as well as the foot.

(2) Be sure to leave the toes exposed for periodic neurovascular checks.

(3) Elevate the foot slightly after splinting to keep swelling of the foot to a minimum.

(4) Transport the patient in a supine position (to keep the foot elevated) to a medical treatment facility.

2-25. HALLUX VALGUS

Hallux valgus is the name for a severe condition that begins with a bunion. The word "*hallux"* is another name for the big toe (the first digit of the foot), and "*valgus"* means bent outward and twisted. In the condition hallux valgus, the big toe bends outward (either over or under the other toes). The large bunion becomes even larger.

a. **Cause of a Bunion**. A bunion, a painful foot problem, is an enlargement of the head of the first metatarsal bone (the big toe). See figure 2-13. Signs of a bunion include inflammation, swelling, and protrusion of the base of the big toe. Often the pressure of shoes causes the metatarsophalangeal joint to form a bursa (bunion). A common theory is that high-heeled, narrow-toed shoes were and are responsible for many bunions.

b. **Description of a Bunion**. The bunion enlargement is actually a form of arthritis that indicates that the cartilage and bone under the bump are degenerating. (The cartilage is turning yellow and is pick-marked.) The turning of the toe and the accompanying bump may cause a person to have an extremely wide foot. Additionally, the arch of the foot may sag because of the way the big toe is pulling the entire foot out of shape.

c. **Signs/Symptoms**. Included are the following:

(1) Bony growth at the joint (exostosis).

(2) Inflammation and infection of the toe.

(3) Inflammation of the periosteum (periostosis).

Figure 2-13. Hallux valgus (bunion).

d. **Treatment**. Follow this treatment:

(1) Eliminate the pressure on the affected foot.

. (2) Surgery may be indicated for adolescents or those for whom bunions are persistent problems.

(3) Avoid high-heeled, narrow-toed shoes.

2-26. PES CAVUS (CLAWFOOT)

In this condition, the longitudinal arch is abnormally high. The result is that the toes may curl under in what is described as a "clawfoot" (see figure 2-14).

a. **Signs/Symptoms of Clawfoot.** Included are the following:

(1) Pain in the metatarsals.

(2) Callus formation.

(3) Shortened Achilles tendon.

Figure 2-14. Pes cavus (clawfoot).

b. **Treatment of Clawfoot**. Place a foam rubber bar across the insole just behind the metatarsal heads. In severe cases, surgery may be necessary.

Section VI. PREVENTION OF FOOT PROBLEMS

2-27. FOOT CLEANLINESS

Many, but not all, foot disorders can be prevented by practicing good foot hygiene. Proper care of feet can be achieved by doing the following:

a. Change socks/hosiery as well as shoes daily.

b. Wash feet carefully and dry feet thoroughly paying particular attention to the area between the toes.

c. Let feet air out sometimes; don't keep them locked up in shoes all the time.

d. Keep toenails trimmed straight across.

e. Use creams to keep the skin of the feet soft. Also, use powders to absorb excess moisture and to prevent infection and foot odor.

2-28. FOOT EXERCISE

Exercise the feet to keep them in good health.

a. Walking and running are both good exercises for the feet.

b. A person sitting at a desk or watching television in an easy chair can also indulge in foot exercises.

(1) He can lift his feet and rotate them to limber the feet up.

(2) Achilles tendons and calf muscles can be stretched by tapping the heels and toes on the floor from a sitting position.

(3) Exercise the heel cords by standing and poising the toes on a telephone directory about two inches thick with the heels of the feet flat on the floor.

(4) End foot exercises by hanging a weight, such as a purse, on each ankle and lifting the ankle while sitting.

2-29. CLOSING

The diseases and disorders of the feet included in this lesson represent only a tiny fraction of the total range of foot problems. Your continued research of this subject can be a great boost to your overall competence and value to the AMEDD.

Continue with Exercises

EXERCISES, LESSON 2

INSTRUCTIONS. Complete the following exercises by writing the word or term that properly completes the incomplete statement or by writing the answer in the space provided at the end of the exercise.

After you have completed all the exercises, turn to the "Solution to Exercise" at the end of the lesson and check your answers.

1. The plantar surface of the heel is the _____.

2. The calcaneus bone is the _____.

3. A bony growth from the plantar surface of the calcaneus is_____ syndrome.

4. Calcaneal fat pad displacement can be caused by _____ or _____ of the rear area of the foot.

5. Treat calcaneal fat pad displacement by inserting heel cushions in the shoe to _____ .

6. Another name for bursitis of the heel is _____.

7. Sever's disease is pain which occurs at _____.

8. What is the cause of retrocalcaneal space pain?
   _____
   _____.

9. List two examples of metatarsalgia disorders.

   a. _____.

   b. _____.

10. Arthritis, a disease that attacks joints, can cause _____ and/or _____.

11. List four signs/symptoms of arthritis of the feet.

    a. _____.

    b. _____.

    c. _____.

    d. _____.

12. List three treatments for flat feet.

    a. _____.

    b. _____.

    c. _____.

13. Heloma durum, another name for _____ is a localized overgrowth of skin with a central core.

14. Heloma molle, also known as _____ is a localized overgrowth between the fourth and fifth toe.

15. A nail curving inward with no free spaces at the margins (nail edges) is called _____.

16. Common benign skin tumors caused by a virus are called _____.

17. A bunion causing severe outward turning of the big toe toward the other toes of the foot is a description of _____.

18. What is a march fracture? _____.

19. A person born with flat feet may be better suited to marching than someone born with _____.

20. Warts on the hands and feet have many of the same characteristics, but a _____ wart is located on the feet.

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES, LESSON 2

1. Sole of the feet. (para 2-4)

2. Heel bone. (para 2-3a)

3. Calcaneal spur. (para 2-4)

4. Inversion; eversion. (para 2-5)

5. Cushion the heel of the foot. (para 2-5)

6. Haglund's deformity. (para 2-7)

7. The margins of the heel. (para 2-6)

8. Fracture of the posterior lateral tubercle of the talus that has injured the plantar flexion. (para 2-8)

9. Morton's syndrome.
   Morton's neuroma. (paras 2-10 and 2-11).

10. Pain; deformity. (para 2-12)

11. You are correct if you listed any four of the following:
    Stiffness.
    Grinding and grating sound from joints.
    Tension in the joints.
    Bulging bone formation. Pain.
    Restriction of movement. (para 2-15)

12. Arch supports
    Warm footbaths
    Aspirin (2-17b)

13. Hard corns. (para 2-18)

14. Soft corns. (para 2-19)

15. An ingrown toenail. (para 2-20)

16. Plantar warts. (para 2-22)

17. Hallux valgus. (para 2-25)

18. A march fracture is a stress fracture of the metatarsal. (para 2-24)

19. Higher arches. (para 2-17)

20. Plantar. para 2-22b NOTE)

End of Lesson 2